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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/822,707	04/13/2004	Dien Nguyen	079173--0117	2912

22428 7590 06/19/2007

FOLEY AND LARDNER LLP
SUITE 500
3000 K STREET NW
WASHINGTON, DC 20007

EXAMINER	
CHUO, TONY SHENG HSIANG	
ART UNIT	**PAPER NUMBER**
1745	
MAIL DATE	**DELIVERY MODE**
06/19/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/822,707	NGUYEN, DIEN	
	Examiner	Art Unit	
	Tony Chuo	1745	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *14 May 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,4,5,7-17,19-24,26,28,29 and 31-36* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,4,5,7-17,19-24,26,28,29 and 31-36* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *13 April 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 5/14/07 has been entered.

Response to Amendment

2. Claims 1, 4, 5, 7-17, 19-24, 26, 28, 29, and 31-36 are currently pending. Claims 6, 18, and 27 have been cancelled. The amended claims do overcome the previously stated 102 and 103 rejections. However, upon further consideration, claims 1, 4, 5, 7-17, 19-24, 26, 28, 29, and 31-36 are rejected under the following new 103 rejections.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 1, 4, 5, 7-17, 19-24, 26, 28, 29, and 31-36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Barker et al (US 2005/0155490) in view of Cable et al (US 2003/0077498).

Regarding claims 1, 13, and 17, the Barker reference discloses a gas separator plate "14" for a solid oxide fuel cell, comprising: a first and second non-ionically and non-electrically conductive ceramic layers "22" & "24" comprising opposing major surfaces; a plurality of first perforations "28" which extend from the first major surface of the ceramic gas separator up to the intermediate layer "26"; a plurality of second perforations "28" which extend from the second major surface of the ceramic gas separator plate up to the intermediate layer "26", wherein the second perforations are offset from the first perforations; a plurality of electrically conductive first plug materials "30" located in the plurality of first perforations, wherein the first plug materials are exposed below, in or over the first major surface of the gas separator plate and the first plug materials are located in electrical contact with the intermediate layer "26"; and a plurality of electrically conductive second plug materials located in the plurality of second perforations, wherein the second plug materials are exposed below, in or over the second major surface of the gas separator plate and the second plug materials are located in electrical contact with the intermediate layer "26" such that each first plug material is electrically connected to a plurality of the second plug materials; and an intermediate layer "26" located inside the ceramic gas separator plate between the first ceramic layer and the second ceramic layer such that the intermediate layer contacts at

least one first plug material and at least one second plug material (See paragraphs [0066],[0067],[0069],[0070], and Figure 1).

Regarding claims 4-5, 14-16, and 28-29, it also discloses an intermediate layer that extends substantially parallel to gas separator plate surfaces and electrically connects each of the plurality of first plug materials to each of the plurality of second plug materials (See Figure 1).

Regarding claims 7, 8, 19, and 32, it also discloses a gas separator plate comprising a first major surface and a second major surface separated in the separator plate thickness direction; separator plate ceramic layers that are stacked in the separator plate thickness direction; first plug materials that are exposed below, in or over the first major surface of the separator plate; and second plug materials that are exposed below, in or over the second major surface of the separator plate and further comprising gas flow passages located in the first and the second major surfaces of the separator plate (See Figure 1 and paragraph [0053]).

Regarding claims 9-10, 20-21, and 33-34, it also discloses a solid oxide fuel cell stack, comprising: a plurality of gas separator plates "14" and a plurality of solid oxide fuel cells "12" wherein: each solid oxide fuel cell comprises a plate shaped fuel cell comprising a ceramic electrolyte "16", an anode "18" located on a first surface of the electrolyte and a cathode "20" located on a second surface of the electrolyte; each gas separator plate is located between adjacent fuel cells in the stack; each first plug material in each gas separator plate is electrically connected to an adjacent cathode of a first adjacent fuel cell; and each second plug material in each gas separator plate is

electrically connected to an adjacent anode of a second adjacent fuel cell, such that each gas separator plate electrically connects an anode of a first fuel cell and a cathode of an adjacent second fuel cell (See Figure 1 and paragraphs [0066]).

Regarding claims 11, 22, and 35, it also discloses the first and second layers of the gas separator plate that are formed of zirconia or yttria-stabilized zirconia to substantially match the CTE of the electrolyte support layer "16" of the fuel cells "12" (See paragraph [0068]).

Regarding claim 24, it also discloses a method of forming the gas separator plate for a solid oxide fuel cell, comprising: providing a first and second non-ionically and non-electrically conductive ceramic layers "22" & "24"; forming a plurality of first perforations "28" extending through the first ceramic layer; forming a plurality of second perforations "28" extending through the second ceramic layer; laminating the first ceramic layer and the second ceramic layer to form a ceramic gas separator by coating the third intermediate layer onto the inner surface of the second ceramic layer and then superposing the first ceramic layer onto the third intermediate layer, wherein the first perforations are offset from the second perforations in the stacked layers; sintering the laminated first and second ceramic layers to form a sintered ceramic gas separator plate; coating the outer surfaces of the gas separator plate with plug materials to fill the first and second perforations after the step of sintering to form a plurality of electrically conductive first plug materials in the plurality of first perforations and a plurality of electrically conductive second plug materials in the plurality of second perforations, so as to ensure that electrically conductive paths are provided via the perforations and the

third intermediate layer from one of the outer surfaces to the other outer surface layer of the gas separator plate; and forming a third intermediate layer "26" comprising a continuous layer on at least one of the first ceramic layer and the second ceramic layer prior to laminating the first ceramic layer and the second ceramic layer such that the intermediate layer is located between the first and second ceramic layers after the step of laminating (See paragraph [0072],[0073],[0075]).

Regarding claim 26, it also discloses the step of forming the intermediate layer comprises forming the intermediate layer on a surface of the first or the second ceramic layer that is unsintered; the step of laminating the first and the second ceramic layers comprises laminating the first and second ceramic layers that are unsintered after the step of forming the intermediate layer; the step of forming the first perforations comprises forming the first perforations in the first ceramic layer that is unsintered; the step of forming the second perforations comprises forming the second perforations in the second ceramic layer that is unsintered; and the steps of forming the first and the second plug materials comprising forming the plug materials such that the intermediate layer contacts at least one first plug material and at least one second plug material to electrically connect at least one first plug material to at least one second plug material (See paragraphs [0072],[0073]).

However, However, Barker et al does not expressly teach a third separator plate ceramic layer, wherein the second separator plate ceramic layer is located between the first and the third separator plate ceramic layer; a plurality of third vias extending through the third separator plate ceramic layer but not through the first or second

separator plate ceramic layers wherein the third vias are offset from the second vias; a plurality of electrically conductive third fillers located in the plurality of third vias, wherein each of the plurality of third fillers is electrically connected to at least one second filler; a second electrically conductive interconnecting body located between the second separator plate ceramic layer and the third separator plate ceramic layer such that the second interconnecting body contacts at least one second filler and at least one third filler to electrically connect at least one second filler to at least one third filler; and first and second fillers and the interconnecting body comprising materials selected from a group consisting of at least one of the strontium doped lanthanum manganite, strontium doped lanthanum chromite, silver palladium alloys, chromia forming metals, and platinum.

The Cable reference discloses a first separator plate ceramic layer consisting of layers "124" & "125", a second separator plate ceramic layer "122", and a third separator plate ceramic layer consisting of layers "126" & "127", wherein the second separator plate ceramic layer is located between the first and the third separator plate ceramic layers; a plurality of third vias "160c" extending through the third separator plate ceramic layer but not through the first or second separator plate ceramic layers, wherein the third vias are offset from the second vias "160a"; a plurality of electrically conductive third fillers located in the plurality of third vias "160c", wherein each of the plurality of third fillers is electrically connected to at least one second filler; and a second conducting layer "134" located between the second separator plate ceramic layer and the third separator plate ceramic layer, such that the second conducting layer

contacts at least one second filler and at least one third filler to electrically connect at least one second filler to at least one third filler (See Figure 6, Section Y). It also discloses the first and second fillers and the conducting layer selected from the group consisting of platinum, alloys of silver, alloys of palladium, and high chromium alloys (See claim 38).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the Barker gas separator plate to include a third separator plate ceramic layer, wherein the second separator plate ceramic layer is located between the first and the third separator plate ceramic layer; a plurality of third vias extending through the third separator plate ceramic layer but not through the first or second separator plate ceramic layers wherein the third vias are offset from the second vias; a plurality of electrically conductive third fillers located in the plurality of third vias, wherein each of the plurality of third fillers is electrically connected to at least one second filler; a second electrically conductive interconnecting body located between the second separator plate ceramic layer and the third separator plate ceramic layer such that the second interconnecting body contacts at least one second filler and at least one third filler to electrically connect at least one second filler to at least one third filler, wherein the first and second fillers and the interconnecting body comprise materials selected from a group consisting of at least one of the strontium doped lanthanum manganite, strontium doped lanthanum chromite, silver palladium alloys, chromia forming metals, and platinum in order to alter the number of ceramic layers according to the relative electrical and physical properties of the desired interconnect/fuel cell stack,

to create bypass channels to ensure even reactant distribution along the face of the tri-layer, and to utilize filler materials that have adequate conductivity and similar coefficient of thermal expansion as the remaining components of the fuel cell.

5. Claims 1, 4, 5, 7-11, 13-17, 19-22, 24, 26, 28, 29, and 31-35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Barker et al (US 2005/0155490).

Regarding claims 1, 13, and 17, the Barker reference discloses a gas separator plate "14" for a solid oxide fuel cell, comprising: a first and second non-ionically and non-electrically conductive ceramic layers "22" & "24" comprising opposing major surfaces; a plurality of first perforations "28" which extend from the first major surface of the ceramic gas separator up to the intermediate layer "26"; a plurality of second perforations "28" which extend from the second major surface of the ceramic gas separator plate up to the intermediate layer "26", wherein the second perforations are offset from the first perforations; a plurality of electrically conductive first plug materials "30" located in the plurality of first perforations, wherein the first plug materials are exposed below, in or over the first major surface of the gas separator plate and the first plug materials are located in electrical contact with the intermediate layer "26"; and a plurality of electrically conductive second plug materials located in the plurality of second perforations, wherein the second plug materials are exposed below, in or over the second major surface of the gas separator plate and the second plug materials are located in electrical contact with the intermediate layer "26" such that each first plug material is electrically connected to a plurality of the second plug materials; and an intermediate layer "26" located inside the ceramic gas separator plate between the first

ceramic layer and the second ceramic layer such that the intermediate layer contacts at least one first plug material and at least one second plug material (See paragraphs [0066],[0067],[0069],[0070], and Figure 1).

Regarding claims 4-5, 14-16, and 28-29, it also discloses an intermediate layer that extends substantially parallel to gas separator plate surfaces and electrically connects each of the plurality of first plug materials to each of the plurality of second plug materials (See Figure 1).

Regarding claims 7, 8, 19, and 32, it also discloses a gas separator plate comprising a first major surface and a second major surface separated in the separator plate thickness direction; separator plate ceramic layers that are stacked in the separator plate thickness direction; first plug materials that are exposed below, in or over the first major surface of the separator plate; and second plug materials that are exposed below, in or over the second major surface of the separator plate and further comprising gas flow passages located in the first and the second major surfaces of the separator plate (See Figure 1 and paragraph [0053]).

Regarding claims 9-10, 20-21, and 33-34, it also discloses a solid oxide fuel cell stack, comprising: a plurality of gas separator plates "14" and a plurality of solid oxide fuel cells "12" wherein: each solid oxide fuel cell comprises a plate shaped fuel cell comprising a ceramic electrolyte "16", an anode "18" located on a first surface of the electrolyte and a cathode "20" located on a second surface of the electrolyte; each gas separator plate is located between adjacent fuel cells in the stack; each first plug material in each gas separator plate is electrically connected to an adjacent cathode of

a first adjacent fuel cell; and each second plug material in each gas separator plate is electrically connected to an adjacent anode of a second adjacent fuel cell, such that each gas separator plate electrically connects an anode of a first fuel cell and a cathode of an adjacent second fuel cell (See Figure 1 and paragraphs [0066]).

Regarding claims 11, 22, and 35, it also discloses the first and second layers of the gas separator plate that are formed of zirconia or yttria-stabilized zirconia to substantially match the CTE of the electrolyte support layer "16" of the fuel cells "12" (See paragraph [0068]).

Regarding claim 24, it also discloses a method of forming the gas separator plate for a solid oxide fuel cell, comprising: providing a first and second non-ionically and non-electrically conductive ceramic layers "22" & "24"; forming a plurality of first perforations "28" extending through the first ceramic layer; forming a plurality of second perforations "28" extending through the second ceramic layer; laminating the first ceramic layer and the second ceramic layer to form a ceramic gas separator by coating the third intermediate layer onto the inner surface of the second ceramic layer and then superposing the first ceramic layer onto the third intermediate layer, wherein the first perforations are offset from the second perforations in the stacked layers; sintering the laminated first and second ceramic layers to form a sintered ceramic gas separator plate; coating the outer surfaces of the gas separator plate with plug materials to fill the first and second perforations after the step of sintering to form a plurality of electrically conductive first plug materials in the plurality of first perforations and a plurality of electrically conductive second plug materials in the plurality of second perforations, so

as to ensure that electrically conductive paths are provided via the perforations and the third intermediate layer from one of the outer surfaces to the other outer surface layer of the gas separator plate; and forming a third intermediate layer "26" comprising a continuous layer on at least one of the first ceramic layer and the second ceramic layer prior to laminating the first ceramic layer and the second ceramic layer such that the intermediate layer is located between the first and second ceramic layers after the step of laminating (See paragraph [0072],[0073],[0075]).

Regarding claim 26, it also discloses the step of forming the intermediate layer comprises forming the intermediate layer on a surface of the first or the second ceramic layer that is unsintered; the step of laminating the first and the second ceramic layers comprises laminating the first and second ceramic layers that are unsintered after the step of forming the intermediate layer; the step of forming the first perforations comprises forming the first perforations in the first ceramic layer that is unsintered; the step of forming the second perforations comprises forming the second perforations in the second ceramic layer that is unsintered; and the steps of forming the first and the second plug materials comprising forming the plug materials such that the intermediate layer contacts at least one first plug material and at least one second plug material to electrically connect at least one first plug material to at least one second plug material (See paragraphs [0072],[0073]).

However, Barker et al does not expressly teach a third separator plate ceramic layer, wherein the second separator plate ceramic layer is located between the first and the third separator plate ceramic layer; a plurality of third vias extending through the

third separator plate ceramic layer but not through the first or second separator plate ceramic layers wherein the third vias are offset from the second vias; a plurality of electrically conductive third fillers located in the plurality of third vias, wherein each of the plurality of third fillers is electrically connected to at least one second filler; and a second electrically conductive interconnecting body located between the second separator plate ceramic layer and the third separator plate ceramic layer such that the second interconnecting body contacts at least one second filler and at least one third filler to electrically connect at least one second filler to at least one third filler.

However, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the Barker gas separator plate to include a third separator plate ceramic layer, wherein the second separator plate ceramic layer is located between the first and the third separator plate ceramic layer; a plurality of third vias extending through the third separator plate ceramic layer but not through the first or second separator plate ceramic layers wherein the third vias are offset from the second vias; a plurality of electrically conductive third fillers located in the plurality of third vias, wherein each of the plurality of third fillers is electrically connected to at least one second filler; a second electrically conductive interconnecting body located between the second separator plate ceramic layer and the third separator plate ceramic layer such that the second interconnecting body contacts at least one second filler and at least one third filler to electrically connect at least one second filler to at least one third filler because duplication of parts was held to have been obvious *(In re Harza* 124 USPQ 378 (CCPA 1960)).

Response to Arguments

6. Applicant's arguments filed 5/14/07 have been fully considered but they are not persuasive.

The applicant argues that one of ordinary skill in the art would not be motivated to import the gas separator ceramic layer 122 of Cable into the device of Barker because the conductive layer 26 of Barker already functions as a gas separator. The examiner would like to point out that there are other motivations as stated above that are taught by the Cable reference for adding a third ceramic layer to the gas separator plate. Therefore, there is clearly sufficient motivation to modify the Barker reference with the Cable reference.

The applicant also argues that there is no teaching or suggestion in Cable and Barker to fill the vias after sintering. To clarify the Barker reference, the examiner would like to point to paragraphs [0073] and [0075]. The Barker reference discloses the following: "the first layer 22 is then superposed onto the coated material of the third layer on the second layer", "the gas separator plate is then fired at a temperature of about 850 to 920°C", and "the outer surfaces of the gas separator plate 14 are then coated with conductive layers of an Ag-Sn alloy on the cathode side and nickel metal on the anode side ... to fill the perforations 28 from the outside". The Barker reference clearly discloses laminating the first and second ceramic layers, sintering the laminated first and second ceramic layers, and then filling the vias with the filler materials.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tony Chuo whose telephone number is (571) 272-0717. The examiner can normally be reached on M-F, 8:30AM to 5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached on (571) 272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

TC

JONATHAN CREPEAU
PRIMARY EXAMINER